

## **ANAEROBIC DIGESTER – CONTROLLED TEMPERATURE DESIGN AND CHECK DATA REQUIREMENTS**

The following items must be addressed in the design folder for the controlled temperature anaerobic digester. The following sections shall be included:

- 1) Table of Contents
- 2) Design Data Summary
- 3) Operation & Maintenance Plan
- 4) Soils & Foundation Data
- 5) Construction Specifications
- 6) Engineering Drawings
- 7) Erosion & Sediment Control Plan
- 8) Construction Check Data
- 9) Documentation

Listed below are specific items that are required in the design:

### **Table of Contents**

This organizes the design folder.

### **Design Data Summary**

Important data is recorded and is consistent with the rest of the animal waste management system and the nutrient management plan. These include:

- 1) Animal Equivalent Units & variations throughout the year
- 2) Daily manure volume throughout the year
- 3) Daily bedding volume, where applicable
- 4) Manure solids content at digester inlet
- 5) Volume & frequency of other feedstock, where applicable
- 6) Design retention time
- 7) Digester dimensions & volume
- 8) Digester vessel design calculations
- 9) Design calculations & documentation for:
  - 1) Digester cover
  - 2) Inlet and outlet pipes
  - 3) Heating system & controls
  - 4) Mixing equipment, where applicable
  - 5) Gas collection, piping, & controls

- 6) Gas utilization equipment
- 7) Pre-heat tank, etc.
- 8) Gas, electrical, & mechanical safety items

### **Operation & Maintenance Plan**

A written site specific O&M Plan, including:

- 1) Instructions for the initial loading, heating & start up of the digester.
- 2) How & how often to load the feedstock(s) into the digester.
- 3) Instruction on how often & how to monitor and control the temperature of the digester and/or the pre-heat tank.
- 4) Instructions on how and how often to monitor and regulate gas production, pressure, and utilization.
- 5) How to monitor for and control foaming in the digester.
- 6) How often to check for solids accumulation in the digester and/or pre-heat tank, & how to remove the solids
- 7) Instructions for the operation of the gas flare & utilization equipment.
- 8) Safety precautions for all aspects of the digester operation
- 9) An emergency action plan that addresses gas and manure leaks, manure overflows, fire, electrical malfunction, and all hazards.

### **Soils & Foundation Data**

Document compliance with PA Act 187 (1996).

Prepare written soils description for test pits and site specific comments.

Conduct the soils investigation to at least 2 feet deeper than the planned bottom.

Reference pit locations to site contour map.

Document need for rock excavation, drainage, isolation from open foundation rock, and depth limitations based on soils investigation.

## **Construction Specifications**

Enclose PATG Specification(s) 313S and others (e.g. 342, 367, 382, 606, 620, 634) as applicable.

Include any "additional conditions" or items that are site specific or must be defined to supplement the standard specification. (See instructions for use of Specification 313S.)

Add any special or "by-others" specifications for all materials & equipment to be included in the digester, heating system, & gas collection & utilization.

## **Engineering Drawings**

### **GENERAL**

On each drawing sheet, the title block should show the operator's name, type of operation, county and the persons involved in drawing, designing, and checking the storage facility.

All anaerobic digester designs require approval by a registered Professional Engineer or an Engineer with NRCS job approval authority for the type, dimensions and capacity of the digester. If the digester is for a dairy operation, the drawings and specification must be submitted to the local milk sanitarian prior to construction.

Include any standard drawings made by NRCS or designed by others and concurred in by NRCS that are needed, and include them in the drawing index on the cover sheet.

Listed are items that should be included:

### **PLAN VIEW SHEET(S)**

North arrow  
Utilities/roads  
Bench mark(s)  
Scale  
Legend  
Contour lines  
Water well and spring location(s)  
Water courses  
Known sinkhole locations  
Property lines  
Fences & field boundaries  
Existing structures  
Designed structures  
Future structures  
Soils test pit location  
X-section locations  
Foundation drainage & outlet locations  
Component locations  
Borrow area  
Spoil area  
Construction access  
Construction limits

### **CROSS-SECTION SHEET(S)**

Two sections, minimum  
Scale(s)  
Soil test pit profile(s)  
Loading structure/pipe  
Unloading structure/pipe  
Heat, gas, & electrical lines  
Inlet & outlet pipe profiles  
Concrete & reinforcement  
Slopes  
Drainage configuration  
Reference to detail drawings

### **DETAIL SHEET(S)**

Digester cover  
Heating system  
Gas collection  
Electrical system  
Mixing equipment  
Steel schedule

**SEQUENCING STATEMENT WITH:**

E&S control  
 Construction sequences  
 Special considerations  
     Equipment  
     Permits & agreements  
 Vegetative requirements  
 Fencing and safety features  
 References to specific standards and drawings  
 Act 187 (1996) statement

**Erosion and Sediment Control Plan**

See DEP's Erosion and Sediment Pollution Control Program Manual.

**Construction Check Data****QUALITY ASSURANCE PLAN**

A site-specific plan that addresses but is not limited to:

What specific items need inspection and when?

Who will do the actual inspection?

Is any testing equipment required for the inspection?

**ONSITE VISITS**

The QAP must include, at a minimum, as applicable to the specific job, onsite visits prior to:

- 1) Start of construction
- 2) Completion of foundation excavation to observe and record the foundation conditions encountered and compare with the conditions assumed in the design.
- 3) Installing foundation drainage.
- 4) Placement of concrete floor.
- 5) Starting to close up concrete wall forms.
- 6) Placing concrete in walls, setting wall panels, or installing manufactured tanks.
- 7) Starting tank or wall backfill.
- 8) Backfilling transfer pipe, gas pipe, heating pipe, & electric lines.
- 9) Start up of the digester.

**Documentation**

A full set of as-built drawings, with construction certification signatures.

Check survey notes.

Material certifications, photographs, etc. as applicable.

Contractors' certifications of conformance.  
 Engineer's certification of completion.